LIFESCAN

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RD-2050 & RD-2060 SERIES FUNCTION RECORDERS

Operator's Manual

OMEGA ENGINEERING, INC.
An OMEGA Group Company

WARRANTY

OMEGA warrants this unit to be free of defects in materials and workmanship and to give satisfactory service for a period of 13 months from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that our customers receive maximum coverage on each product. If the unit should malfunction, it must be returned to the factory for evaluation. Our Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. However, this WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive current, heat, moisture, vibration, or misuse. Components which wear or which are damaged by misuse are not warranted. These include contact points, fuses, and triacs.

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To avoid processing delays, also please be sure to include:

1. Returnee's name, address, and phone number.
2. Model and Serial numbers.
3. Repair instructions.

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SECTION 1 INTRODUCTION

1.1 GENERAL DESCRIPTION

The OMEGA® RD-2050 and RD-2060 Series Industrial/Analytical Function Recorders are universal measurement and recording systems for use in both the laboratory and the production floor. The RD-2050 Series Recorders feature left-hand zero; the RD-2060 Series feature right-hand zero.

These units are designed for either bench top use or 19" rack mount installation, and are available in single, dual or three channel models, all with plug-in replaceable input modules for a wide variety of measurement applications. To change the input, simply remove the old module and insert the desired module into the recorder. Modules are available for thermocouples, voltage, current, pH, strain gage, and position sensors.

Each unit has standard features including electric pen lift, slide out chart tray, a tilt writing platen for easy notation, 0.5 second full scale response, 0-5 Vdc retransmitting signal (RTO) for computer functions, and a paper tear-off bar. Each channel has an analog output, and rear terminal input connections. Available options include alarms for each channel, protective front door, and 24 Vdc power supplies for powering two-wire transmitters.

1.2 FEATURES

- Bench Top or 19" Rack Mount Vertical Recording Design
- One, Two or Three Channel Recorder with Plug-In Input Module
- Wide 250 mm Chart
- Left-Hand Zero for Industrial Uses or Right-Hand Uses for Analytical Applications

SECTION 2 INSTALLATION

2.1 UNPACKING

Remove the packing list and verify that all equipment has been recieved. If there are any questions about the shipment, please call OMEGA ENGINEERING Customer Service Department at (203) 359-1660.

Upon receipt of shipment, inspect the container and equipment for any signs of damage. Take particular note of any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

NOTE

The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

2.2 POWER REQUIREMENTS

The RD-2050/2060 Mainframes are shipped ready to operate on 115 Vac, 50/60 Hz. Operation at 208 Vac or 240 Vac requires that the top cover be removed and the line voltage selector switch, located at the rear bulkhead (looking from the rear), be rotated to the desired voltage.

WARNING

The mainframe power cord must be disconnected from its source prior to unit disassembly, service or resetting the voltage selector switch. Failure to do so may result in equipment failure and exposure of the operator to potentially lethal voltages. Under no circumstances service the mainframe with the power connected.

The RD-2050/2060 comes complete with a power cord kit for power mains connection. The power strip is located on the rear panel of the mainframe. Remove the barrier strip cover and connect line, neutral and earth ground wires. Observe the legends for proper configuration:

1. BROWN connects to LINE
2. BLUE connects to NEUTRAL
3. YELLOW/GREEN connects to EARTH (GND)

2.3 MODULE INSTALLATION

1. Be sure POWER is OFF.
2. Select the module desired for each channel position.
3. Remove the thumb screw(s) from the rear of the module(s) or storage hole(s) on the rear of the top cover.
4. Insert the module printed circuit board into the guide rails (solder side UP) and press to the rear as far as possible, being sure guide pins engage alignment holes in the front panel.
5. Insert the thumb screw(s) in the hole(s) next to the module input terminals and secure modules in place.

2.4 INPUT SIGNAL CONNECTIONS

For connection to the individual module inputs, refer to the operation/installation section of the appropriate module's instruction manual.

Each module may be driven by signal source lines attached to the signal plus (+) and signal minus (−) located on the rear panel barrier strips. These lines parallel the module input connectors. However, if noise or offset is encountered, the lines should be moved to the module signal inputs.

NOTE

Thermocouple module operation with the thermocouple connected to the rear barrier strip is not recommended due to the lack of a cold junction reference at the barrier strip. Consult the OMEGA Engineering Department for remote cold-junction reference applications.

2.5 CHART PAPER INSTALLATION

1. Depress the Pen Lift switch, located on the front panel (see Figure 2-1), to raise the pens off the paper.
2. Turn the Chart Drive switch OFF.
3. Switch channels to Stand By (STBY)(located on module front panels).
4. Release the chart tray assembly by raising the latches on the right and left sides of the tray.
5. Pull the tray forward as far as possible.
6. Locate the Supply Spool (forward assembly) and Take-Up Spool (rear assembly).
7. Remove the Take-Up Spool by raising it straight UP.
8. Remove the left-hand (black) retainer disk by pulling outward gently.
9. Remove paper if necessary.
10. Place the empty paper core on the Take-Up assembly. (Make sure that the core slot aligns with the raised drive finger on the gear side of the spool.)
11. Replace the left-side retainer disc.
12. Replace the Take-Up Spool in its slots and make sure that the gear teeth mesh with the power train gears.
13. Remove the Supply Spool assembly.
14. Place a new roll of paper on the Supply spool (paper must feed over the top and toward the front when installed) and replace it in its slots..
15. Feed the paper under the hold-down guides and over the feed sprockets making sure that the paper is aligned evenly and engaged with the feed sprockets.
16. Feed the paper under the plastic tear-off bar.
17. Feed about 18 inches of paper through the sprockets by turning the gear assembly counterclockwise (CCW).
18. Guide the paper under the paper tray and bring it up through the cut-out under the paper Take-Up assembly.
19. Align paper on the Take-Up Core and hold in place with tape.
20. Take up the slack by turning the Take-Up Spool by hand.
21. Return the paper tray into position. Make sure that the retaining latches hold the tray in position.
22. Depress the Pen Lift switch to return the pens to the paper surface.
23. Turn the Chart switch ON and the module REC/STBY switches to REC to begin recording.

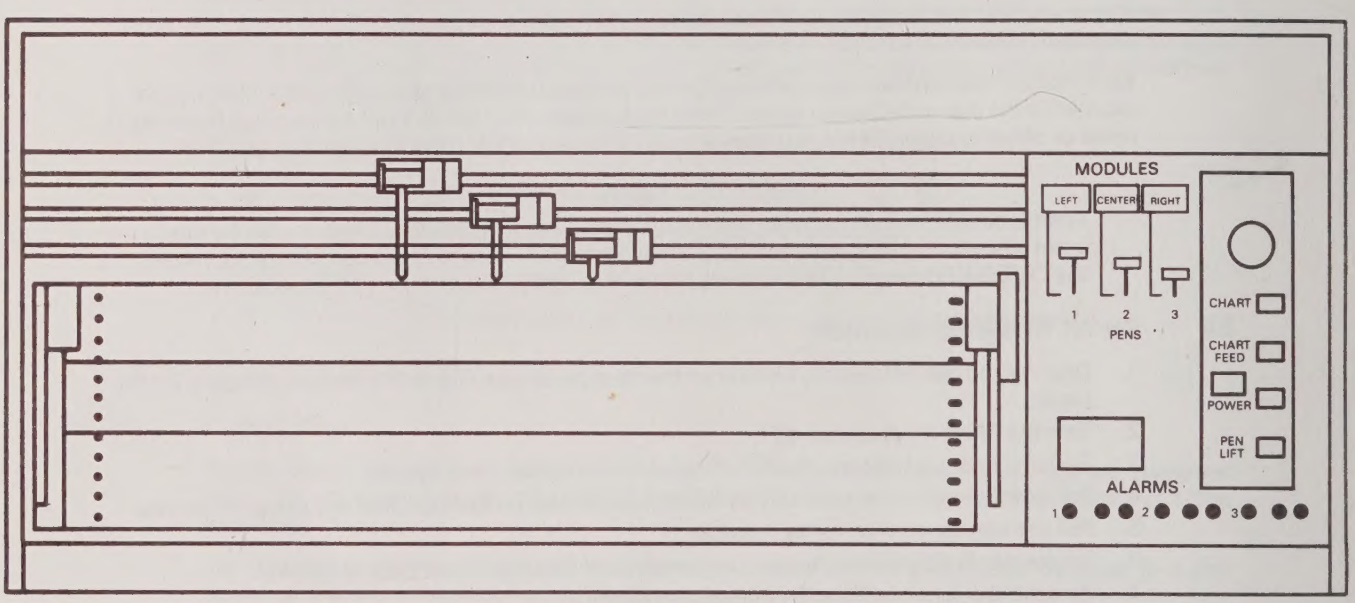


Figure 2-1. Front Panel Controls RD-2050/2060 Series Recorders

2.6 PEN INSTALLATION

1. Turn POWER ON.
2. Depress the Pen Lift switch (on front panel).
3. Insert the pens into the holders as far as possible.

NOTE

Pens required:
3 Channel Models - Short, Medium and Long
2 Channel Models - Medium and Long
1 Channel Models - Medium

4. Insure that each pen has its cap removed and is fully seated into its respective holder. There should be no interference between the pens.
5. Depress the Pen Lift switch on the front panel to lower the pens.

2.7 GROUNDING

1. To insure the best performance and to eliminate sources of noise and offset, the mainframe earth ground ( ) and the signal source earth ground ( ) should be common. The earth ground wire in the power cord is connected to the mainframe chassis, but not to the signal negative (−). If the signal input source does not have a third wire in its power cord, or if the mainframe is not earth grounded (not recommended), connect a wire between the chassis earth ground terminal and the chassis of the signal source.
2. In case of large normal mode signals, particularly 120 Hz, connect the mainframe chassis earth ground terminal to the normal mode source.

SECTION 3 OPERATION

3.1 RECORDING PROCEDURE

1. The following is a prerequisite to recording:
   a. Power is connected and POWER switch is OFF.
   b. Paper is installed.
   c. Pens are installed.
   d. Modules are installed and connected to the signal sources.

WARNING

DO NOT install or remove the plug-in modules when POWER is ON, since serious damage to the mainframe or the module can occur.

2. Turn POWER ON and the green power light should light. If not, there may be a problem with the voltage selection, power line connection or the primary fuse. Re-inspect and replace fuse if necessary.
3. Select the desired CHART SPEED and turn CHART ON.
4. Lower the pens if necessary and ZERO the pens, using the module ZERO controls, to the desired grid line on the chart paper.

NOTE

The ZERO position on the RD-2050 Series is on the LEFT side of the chart. The ZERO position on the RD-2060 Series is on the RIGHT side of the chart.

5. If the instrument cannot be made operational, please consult the OMEGA Customer Service Department at (203) 359-1660.

3.2 SPECIAL FEATURES/OPTIONS

3.2.1 Electric Pen Lift

The pen lift function can be activated by using the push-button switch labeled "PEN LIFT" located on the front panel. This switch is a push-lock/push-release type.

Rear panel barrier strip activation of the pen lift is accomplished by a contact closure between the "PEN LIFT" terminal and "+ UNREG".

3.2.2 Override Event Marker

Each channel has an override event marker function which is a superimposed +2% spike on the analog trace. This function is activated by a contact closure between the "OVERRIDE EVENT" terminal and the "SIGNAL – " on the rear barrier strip.

3.2.3 Auxiliary Signal Input

The SIGNAL – and SIGNAL + terminals located on the rear panel barrier strip allow an alternate method of signal input. (Refer to paragraph 2.4.)

3.2.4 Signal Output for Computer or Retransmission (RTO)

A buffered 0 to 5 Vdc, customer adjustable, output signal is available at the rear panel barrier strip between the RTO terminal and the SIGNAL – terminal. The signal adjustment is located in the signal conditioning module and the procedure for setting it is located in the appropriate module operator's manual.

The maximum current drive is 20 mA and should generally be connected to the input of a high impedance voltage follower to prevent loading of the signal.

3.2.5 Paper Tear-Off Bar

The mainframe is shipped with a standard scale printed on the Tear-Off bar reading 0-100 (RD-2050) and 100-0 (RD-2060).

3.2.6 DC Power Operation

1. Each channel is powered by an isolated power supply located on the servo drive amplifier. Multiple channel units must use separate DC power sources or separate batteries to power each servo amplifier.
2. A power connector is available on the servo amplifier and requires a DC level of 12 to 18 volts.
3. The system constraint in this configuration is in not being able to connect Power Ground and SIGNAL – together. The SIGNAL – is an artificial level 4 Vdc above Power Ground. This means the signal source must have a floating ground with respect to Power or System ground.

3.2.7 Fast Chart Advance

This function control is located on the front panel and labeled "CHART FEED". The switch is a momentary push type.

Pushing the switch "IN" sets the chart speed to 30 cm/min whether the chart power is on or off and is independent of the preset speed.

3.2.8 Mainframe Stacking

The rubber feet on the bottom panel may be loosened and rotated 180° and retightened to accommodate stacking of the mainframes to conserve bench space. The feet grip the end panels and hold each upper unit in place.

3.2.9 Alarm Cards (Optional)

Alarms are available for each channel. Alarm PCB's provide relay output for high and low settable alarms or fail-safe operation. A Green (Low)/Red (High) front panel mounted LED provides visual limit indication. Both limits are adjustable from the front panel.

3.3 ALARM MODULE OPERATION

3.3.1 Introduction

The alarm module is designed to alert the user or external device of a high or low alarm condition when pre-set high or low limit has been reached. Relay outputs consisting of two SPDT relays allow the user to connect external devices to the alarm module. Each relay has three terminals, Normally Open (NO), Normally Closed (NC) and Common or Arm, which are accessible via rear panel terminal strips.

There are two internally selectable modes of operation: Set Point and Fail-Safe. The Set Point mode energizes the appropriate relay only during an alarm condition and remains de-energized during normal operation. The fail-safe mode de-energizes the relay during an alarm condition or when the recorder is inoperative for any reason and remains energized during normal operation.

3.3.2 Operation

The following instructions are for left-hand zero models (RD-2050). For right-hand zero models (RD-2060) rotate the HIGH and LOW trimmers in the opposite direction.

1. To set the HIGH and LOW alarm limits, place the recorder in the standby (STBY) mode located on the recorder module front panel.
2. Rotate the HIGH trimmer control fully clockwise and the LOW trimmer fully counterclockwise.
3. Position the pen on the chart paper, using the ZERO control located on the recorder module, to the desired HIGH limit.
4. Rotate the HIGH trimmer counterclockwise until the RED indicator on the front panel lights. This sets the HIGH limit for the input signal.
5. Position the pen on the chart paper, using the ZERO control on the recorder module, to the desired LOW limit.
6. Rotate the LOW trimmer clockwise until the GREEN indicator lights. This sets the LOW limit for the signal input.
7. If the recorder has more than one channel, repeat steps 1 through 6 for each channel.
8. DO NOT set the LOW limit greater than the HIGH limit as this will cause improper operation.

3.3.3 Changing Operating Mode

To change operating mode, Set Point or Fail-Safe, disconnect all power from the alarm module and the recorder.

1. Remove hardware as necessary to allow access to the alarm PCB components.
2. Located near the front of the PCB are two BLUE jumpers:
   Set Point Mode: Jumper W1 and W4
   Fail-Safe Mode: Jumper W2 and W3
3. When changing from one mode to the other be sure to identify the correct relay as HIGH and LOW as this will change also.

WARNING

Relay contacts are NOT internally fused and, therefore, must be protected by the user to prevent damage and potential shock hazard.

3.3.4 Relay Specifications

3 amp at 30 Vdc or 120 Vac
2.5 amp at 240 Vac resistive
1/10 HP, 120 Vac, 240 Vac

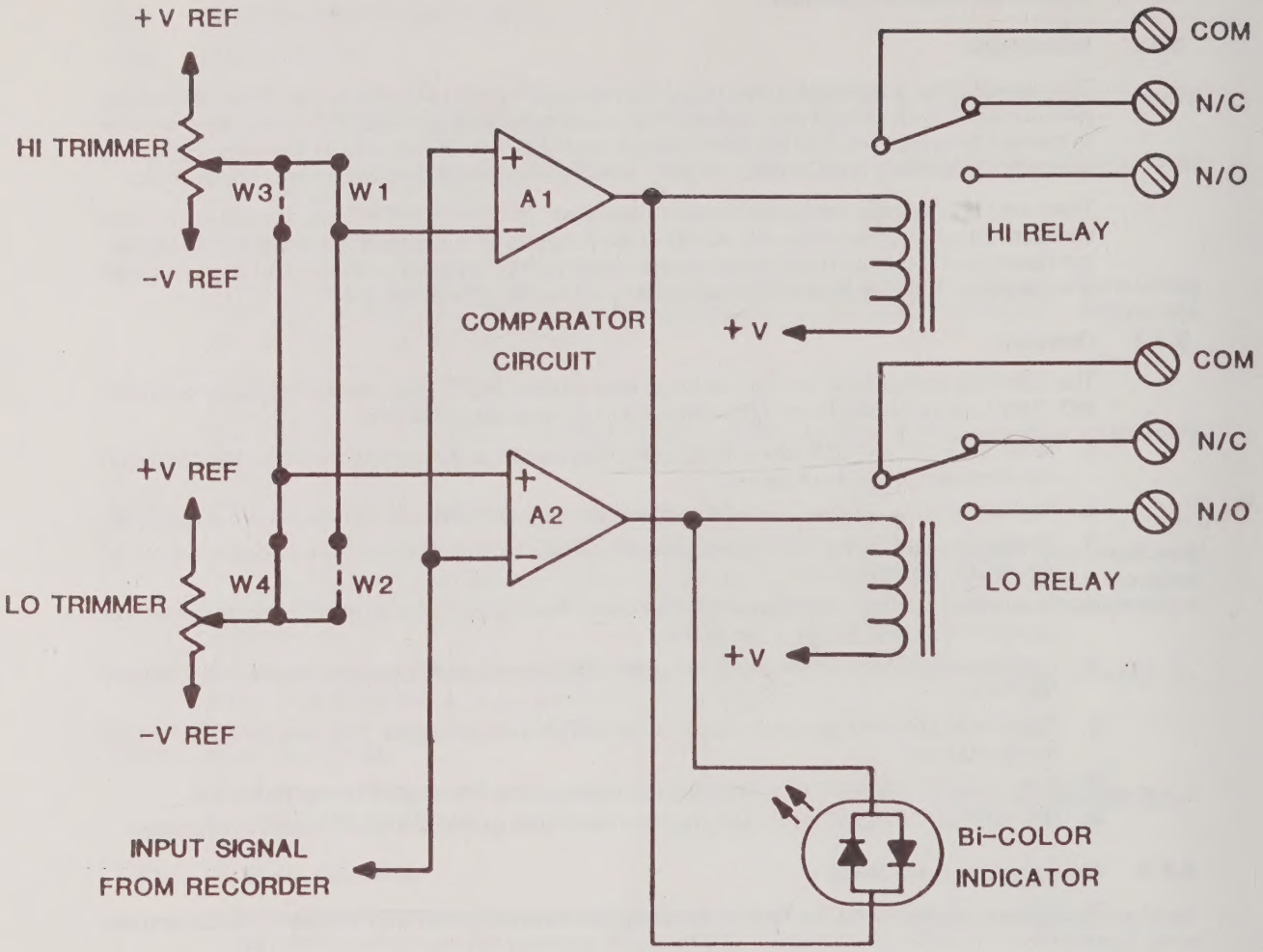


Figure 3-1. Alarm Module Block Diagram

SECTION 4 CALIBRATION

The RD-2050/2060 is designed to be simple, reliable, easy to maintain and repair. The Power Supply and Chart Drive require no calibration. Therefore, the procedure presented here is for the Pen Drive System. For special problems we recommend that you contact the OMEGA Customer Service Department at (203) 359-1660.

CAUTIONS

DO NOT install or remove plug-in modules when power is ON, since serious damage to the recorder or module could result.

The calibration of the Pen Drive System that is covered in this section must be performed only by a qualified technician. The technician must be aware of voltages which may cause electrical shock.

NOTE

The procedure given is for a single pen recorder. Calibration of two and three pen models is identical, except that the procedure must be repeated for the second and third channel.

4.1 PRELIMINARY SET-UP

1. Turn power OFF.
2. Locate the Calibration Controls on the rear of the unit (refer to Figure 4-1). Each channel has its own set of Calibration Controls.
3. Turn the ''UPPER LIMIT'' control fully clockwise. Turn ''LOWER LIMIT'' control fully counterclockwise.
4. Install paper, pen(s) and input module(s) if not previously done.
5. Connect line power to recorder.
6. Turn recorder POWER switch ON.

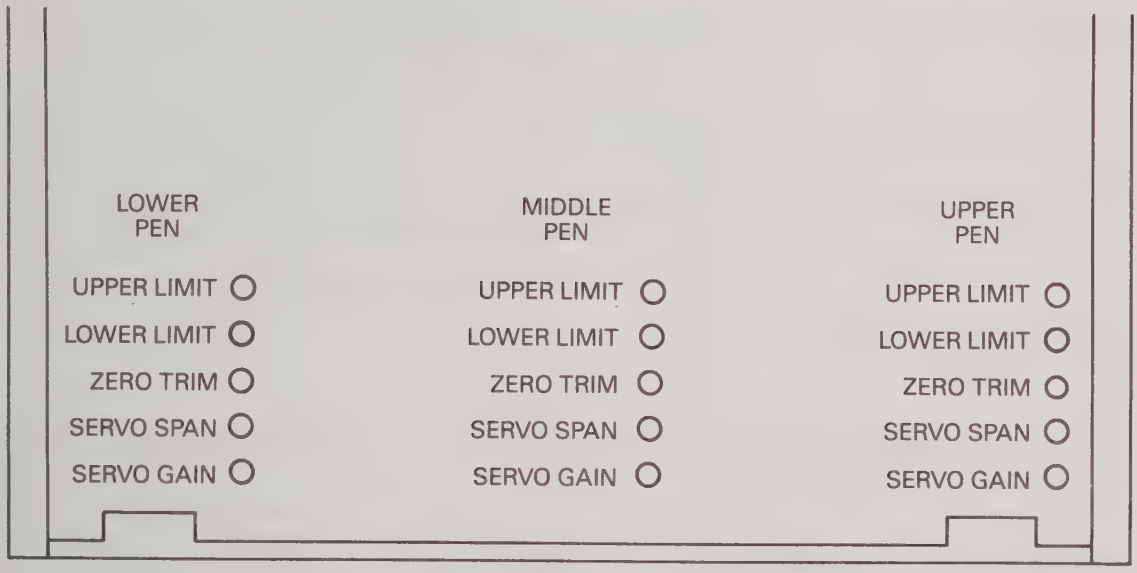


Figure 4-1. Mainframe Calibration Controls

4.2 GAIN ADJUST

The GAIN adjustment controls the servo loop gain of the recorder. If set too high, the pen will "buzz". If set too low, the pen will be sluggish.

1. Check that the pen is DOWN and turn CHART switch ON.
2. Zero the pen to approximately mid-scale.
3. Adjust the GAIN control clockwise (CW) until the pen "buzzes", then back counterclockwise (CCW) until the "buzzing" just stops plus 1/8 turn.

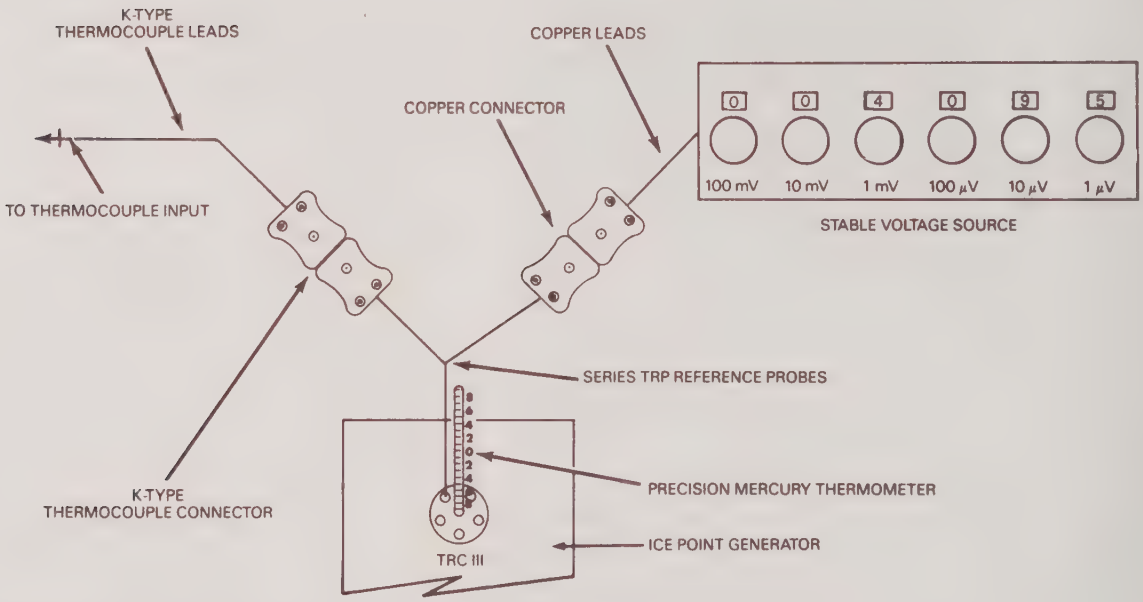
4.3 ZERO TRIM

Adjust the servo (pen) to ZERO with a zero input signal. The input signal will depend on which signal conditioning module is being used for that channel. For example, if the RD-MV is being used, a 0 mV signal would be inputted.

Set pen to the ZERO grid line using the ZERO TRIM control with zero (short) input to the recorder.

NOTE

For thermocouple modules, input a mV signal equivalent to 0°C or 32°F (or the temperature that corresponds to the zero point on the chart) (see Section T in the OMEGA COMPLETE TEMPERATURE MEASUREMENT HANDBOOK AND ENCYCLOPEDIA™ for temperature/mV equivalencies). Refer to Figure 4-2 for the calibration set-up for the thermocouple modules.



Example shown for type K thermocouple

Figure 4-2. Calibration Set-Up When Using Thermocouple Modules for Mainframe Calibration

4.4 SPAN ADJUST

Provides adjustment so that a calibrated full scale input signal will move the pen the full width of the chart.

1. Input a full scale input (input will depend on which signal conditioning module is being used) to the servo input.

NOTE

For thermocouple modules, input a mV signal (refer to Figure 4-2) equivalent to the full scale input temperature (see Section T in the OMEGA COMPLETE TEMPERATURE MEASUREMENT HANDBOOK AND ENCYCLOPEDIA™ for temperature/mV equivalencies).

2. Adjust the SPAN control to position the pen exactly on the 100% grid line.
3. Remove the input signal.

4.5 UPPER LIMIT

Provides electronic shutdown of the pen drive when an overrange condition exists.

1. Adjust the pen to the right edge of the left sprocket holes.
2. Position the pen half-way between the left edge of the chart and the sprocketed holes using the UPPER LIMIT control.

4.6 LOWER LIMIT

1. Adjust the pen to the left edge of the right sprocket holes.
2. Position the pen half-way between the right edge of the chart grid and the sprocket holes using the LOWER LIMIT control.

This completes calibration of the mainframe.

SECTION 5 MAINTENANCE AND TROUBLESHOOTING

5.1 OPERATIONAL TIPS AND MAINTENANCE

Chart paper and pens have been carefully matched for optimum writing and minimum bleed. Substitutions could cause improper writing. Keep pen tips covered when not in use to prolong life.

NOTE

If the pen is left uncapped for long periods and dries out, it may be revitalized by dipping it in water for a few seconds.

Allow the recorder to warm up for about 30 minutes before calibration or use if high accuracy/stability recording is desired.

Firm tension on the paper roll and correct alignment of the chart paper holes on the sprocket teeth are required for proper chart feed.

The exterior surfaces of the recorder should be cleaned periodically by wiping with a damp cloth. Water may be used to remove ink, etc.

NOTE

Solvents should NOT be used as they may damage or destroy the finish on the recorder.

5.2 TROUBLESHOOTING

The modularity and simplicity of the recorder make it possible to isolate the problem area in many cases. While it is impossible to think of every problem possibility. Table 5-1, Troubleshooting Chart, will give you suggestions on how to solve the most common recorder problems.

TABLE 5-1
TROUBLESHOOTING CHART

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
ANALOG SECTION		
Pilot light does not light and recorder is inoperative	AC power source disconnected	Connect AC power source.
	Main fuse blown	Replace fuse.
	Input voltage selector switch in wrong position	Check switch on left rear side.
Pilot light ON, one or more channels inoperative	Signal input leads disconnected	Check input connections.
	Servo driver PCB connector loose	Check board connections.
	Servo driver fuse blown	Remove top cover; replace fuse.
	Gain set too low	Adjust gain control.
	Defective servo driver PCB	Replace board.
	Defective servo motor	Replace servo motor.
Excessive deadband	Gain set to low	Adjust gain control
	Excessive normal mode signal	Connect ground terminal to source of normal mode signal.
	Recorder ground not connected to signal source ground	Provide a common for third wire in power cord.
	Pen drive cable too loose	Contact OMEGA Customer Service Department at (203) 359-1660.
Noise on pen trace	Noisy input signal	Check signal source. Move input connections to rear of module.
	Gain too high	Adjust gain control.
	Earth ground not connected	Provide common for third wire in power cord.
Pen trace has isolated steps	Pen carriage rod dirty	Clean pen carriage rod.
	Servo driver gain too low	Adjust gain control.
	Defective servo motor	Replace servo motor.
	Defective servo potentiometer	Contact OMEGA Customer Service Department.
Pens stop but will catch up if pushed	Defective servo motor	Contact OMEGA Customer Service Department.
Pens writes poorly	Ink supply depleted	Replace pen.
Chart drive inoperative	Loose or defective connections	Check connections.
	Defective chart drive motor	Contact OMEGA Customer Service Department.
	Defective chart drive PCB	Contact OMEGA Customer Service Department.
	Defective chart drive switch	Contact OMEGA Customer Service Department.
	Gear train binding	Contact OMEGA Customer Service Department.
No chart drive	Loose or defective connections	Check connections.
	Defective chart drive PCB	Contact OMEGA Customer Service Department.

SECTION 6 SPECIFICATIONS AND ACCESSORIES

6.1 SPECIFICATIONS

SERVO

ACCURACY:	1. Zero Trim 2. Servo Gain 3. Full Scale Span 4. Upper Limit 5. Lower Limit
DAMPING:	Critically damped; no adjustment required
DEADBAND:	Typically less than 0.2%
FEEDBACK ELEMENT:	Hybrid rotary potentiometer
INPUT:	Buffered with active filter: 100 mV
INPUT CONNECTIONS:	Rear panel barrier strips and rear of modules
LINEARITY:	±0.25%
MAXIMUM INPUT:	30 V RMS
MEASURING CIRCUIT:	Potentiometric null balance
OPERATING HUMIDITY:	10% to 85% relative humidity, non-condensing
OPERATING TEMPERATURE:	0° to 40°C
OVERRANGE PROTECTION:	Electronic clamp; upper lower limit
RESPONSE:	0.5 seconds full scale

CHART

DRIVE:	High torque stepper motor; quartz crystal referenced
PAPER:	Writing width: 25 cm Length: 30 meters Type: roll Chart Grid: 1 mm divisions Scale: 100 divisions (0-100 and 100-0)
SPEED ACCURACY:	Less than 0.03% error
SPEEDS:	1,2,5,10,20 and 30 cm/minute and hour; push-button fast chart advance at 30 cm/min
TRAY:	Tilt out writing platen; reroll paper take-up; slide out tray with stops; tear bar and paper hold-downs

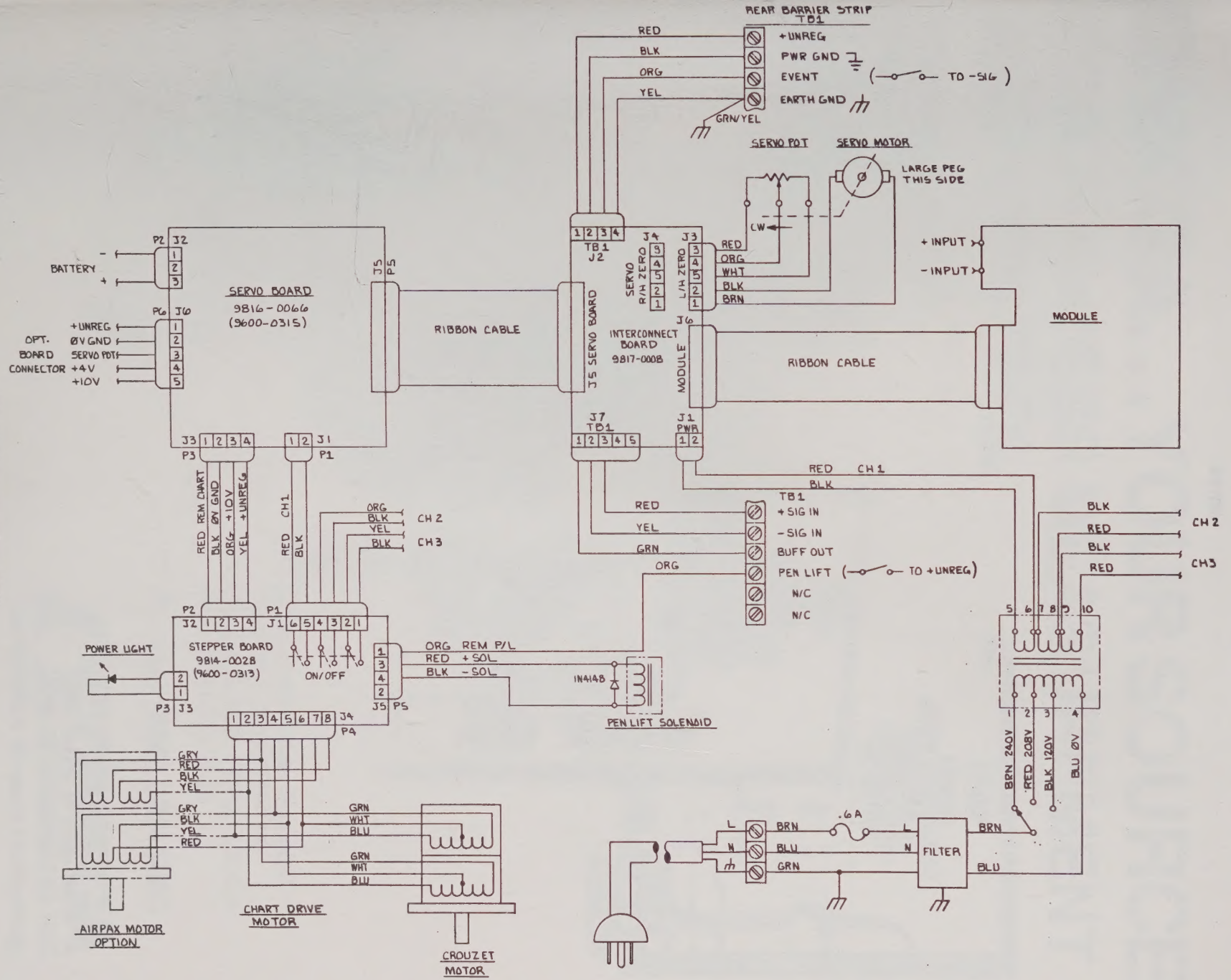
GENERAL

ACCESSORIES FURNISHED:	Paper feed spool; paper take-up spool; paper take-up core; one roll chart paper; power cord; pen(s) and instruction manual
CASE:	Steel housing with aluminum end plates
DIMENSIONS:	W: 16.62" (42.21 cm) x D: 12" (30.48 cm) x H: 6.96" (17.68 cm)
EARTH GROUND:	1. Via power cord to chassis 2. Rear panel barrier strip connection
EVENT MARKER:	Override - standard each channel: +2% spike activated by contact closure at rear panel
FRONT PANEL CONTROLS:	Power ON/OFF; chart ON/OFF; chart speed; chart feed; electric pen lift; and optional alarm set point controls
FUSES:	Primary: 0.6 amp, SB, 3AG Servo Board: 1 amp, MB, 5 x 20 mm
LINE FILTER:	Inline power filter

MOUNTING:	Bench, rack or panel
PEN LIFT:	Electronic; front panel push-button or rear panel contact closure
POWER REQUIRED:	120 Vac, 208 Vac or 240 Vac switch selectable; 12 Vac or 12 Vdc, optional
WEIGHT:	Model RD-2051/2061: 21 lbs. (9.53 kg) Model RD-2052/2062: 22 lbs. (9.98 kg) Model RD-2053/2063: 23 lbs. (10.43 kg)
WRITING SYSTEM:	Disposable fiber tipped pens: Channel 1 - long pen Channel 2 - medium pen Channel 3 - short pen

6.2 ACCESSORIES

MODULES, PLUG-IN	PART NUMBER
Millivolt/volt	RD-MV
Current	RD-I
Temperature	RD-TC
pH	RD-PH
LVDT	RD-LV
Strain Gage	RD-SG
Extender	RD-EXT
PAPER	
paper, roll, 250 mm chart x 30 meters long	0100-0025
PENS	
Short nib, BLUE	0100-0105
Short nib, RED	0100-0106
Short nib, BLACK	0100-0107
Short nib, GREEN	0100-0108
Medium nib, BLUE	0100-0109
Medium nib, RED	0100-0110
Medium nib, BLACK	0100-0111
Medium nib, GREEN	0100-0112
Long nib, BLACK	0100-0131
Long nib, GREEN	0100-0132
FUSES	
0.6 Amp, Slo-Blo, 3AG	5120-0010
1 Amp, Medium Blo, 5 x 20 mm	5120-0016
TWO-WIRE POWER SUPPLY	
Transmitter power supply for single channel	T1
Transmitter power supply for two channels	T2
Transmitter power supply for three channels	T3
ALARMS	
Alarm for single channel	A1
Alarm for two channels	A2
Alarm for three channels	A3


REAR BARRIER STRIP
TB1
+UNREG
PWR GND
EVENT
EARTH GND
TO -SIG
RED
BLK
ORG
YEL
GRN/YEL
SERVO POT
SERVO MOTOR
LARGE PEG THIS SIDE
CW
+ INPUT
- INPUT
MODULE
RIBBON CABLE
BATTERY
SERVO BOARD
9816-0066
(9600-0315)
OPT. BOARD CONNECTOR
+UNREG
ØV GND
SERVO POT
+4V
+10V
J5 SERVO BOARD
SERVO R/H ZERO
L/H ZERO
INTERCONNECT BOARD
9817-0008
MODULE
TB1 J2
J4
J3
J6
J7 TB1
J1 PWR
P1
P2
P3
P4
P5
P6
RED REM CHART
BLK ØV GND
ORG +10V
YEL +UNREG
RED CH1
BLK
ORG
BLK
YEL
BLK
CH 2
CH 3
+SIG IN
-SIG IN
BUFF OUT
PEN LIFT
TO +UNREG
N/C
N/C
POWER LIGHT
STEPPER BOARD
9814-0028
(9600-0313)
ON/OFF
ORG REM P/L
RED +SOL
BLK -SOL
IN4148
PEN LIFT SOLENOID
GRY
RED
BLK
YEL
GRY
BLK
YEL
RED
GRN
WHT
BLU
GRN
WHT
BLU
AIRPAX MOTOR OPTION
CHART DRIVE MOTOR
CROUZET MOTOR
.6A
L
N
BRN
BLU
GRN
FILTER
BRN 240V
RED 208V
BLK 120V
BLU ØV

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